

REMARKS:

INTRODUCTION:

In accordance with the foregoing, claims 1 and 3 have been amended and claims 5 – 19 have been added. No new matter is being presented, and approval and entry are respectfully requested. Claims 1 – 19 are pending and under consideration. Reconsideration is respectfully requested.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action, at pages 2 – 3, numbered paragraph 2, claims 1 – 4 were rejected under 35 U.S.C. §103 over Kato et al. U.S. Patent No. 6,486,629 (hereinafter “Kato”) or Hiroshi et al. Japan Publication No. 2002-035953 (hereinafter “Hiroshi”) in view of Yoshio Japan Publication No. 61-112585 (hereinafter “Yoshio”) and Kleinau et al. U.S. Patent No. 6,900,607 (hereinafter “Kleinau”). The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

The Prior Art

The Kato et al. reference and the Hiroshi Publication are directed to a servo welding gun with welding tips driven by a servomotor without taking into account the influence of temperature variation, as discussed in the Description of the Related Art section of the subject application. The Yoshio reference discloses a torque controller of a permanent magnet motor in which temperature of the motor is detected and the driving current of the motor is corrected in accordance with the detected temperature.

§103 Rejection Of Claims 1 – 4

Claims 1 and 3 recite “a temperature sensor arranged at a suitable position for detecting a temperature of the servomotor and movable components of the spot welding gun” and “detecting a temperature of the servomotor and movable components of the spot welding gun”, respectively. In the 35 U.S.C. §103 rejection of claims 1 and 3, the Examiner relied on the Yoshio reference to teach these features. The Yoshio reference discloses the use of a

temperature sensor to control the torque generated from a motor by correcting the current flow to the motor in response to the temperature of only the motor. (Yoshio Abstract) In contrast, the present invention is directed towards detecting the temperature of the servomotor and other movable components of the spot welding gun. Although the Examiner deems it obvious to use the temperature sensing of Yoshio in controlling a servo welding gun, there is no disclosure or suggestion of considering variation in a friction loss of movable components of a drive force transmission mechanism in Yoshio. Therefore, claims 1 and 3 are patentably distinguishable over the prior art.

Claims 2 and 4 depend from claims 1 and 3, respectively, and include all the features of claims 1 and 2 plus additional features not taught or suggested by the prior art. For example, claims 2 and 4 recite "wherein a controller that compensates a commanded pressing force using a relation between variation of the temperature and variation of the pressing force" and "wherein said controlling of the servomotor includes compensating a commanded pressing force using a relation between variation of the temperature and variation of the pressing force", respectively. In the 35 U.S.C. §103 rejection of claims 2 and 4, the Examiner relied on the Hiroshi and Yoshio references to teach these features of the present application. Although the Hiroshi reference and the Yoshio reference do teach the correction of command pressing force in relation to actual pressing force and motor temperature, respectively, neither the Hiroshi or the Yoshio references teach the compensating of commanded pressing force using a relation of both variation of temperature and variation of actual pressing force. In contrast, the present invention as set forth in claims 2 and 4, is directed towards the compensation of command pressing force in relation to both the actual pressing force and the temperature of the servomotor and the other movable components of the spot welding gun. Therefore, claims 2 and 4 are patentably distinguishable over the prior art.

NEW CLAIMS 5 – 19:

Claim 5 recites "calculating a pressing force compensating amount taking into account the temperature and the pressing force" and "determining a temperature of the servomotor and movable components of the spot welding gun". None of the cited references teaches these features. Therefore, claim 5 is patentably distinguishable over the prior art.

Claims 6 – 11 and 13 – 19 depend from claim 5 and include all the features of claim 5 plus additional features not taught or suggested by the prior art. For example, "determining

whether or not a control changeover signal has been issued to the servomotor" as set forth in claim 6; "wherein said calculating pressing force compensating amount taking into account temperature and the pressing force uses an equation of form: $\alpha = A \times (T - T_0)$ " as set forth in claim 7; "wherein estimating a disturbance torque uses a disturbance torque observer built in a servo CPU" as set forth in claim 8; "wherein said calculating a torque command for position control uses an equation of form: $\tau = K_1 \times (r - y)$ " as set forth in claim 9; "wherein said compensating the pressing force command uses an equation of form: $p' = p - \alpha$ " as set forth in claim 10; "wherein said calculating a torque command for pressing force control uses an equation of form: $\tau = K_2 \times (p' - d)$ " as set forth in claim 11; "wherein said calculating a pressing force compensating amount taking into account the temperature and the pressing force uses a function selected from a group consisting of a quadratic function, a higher order function, or an other function" as set forth in claim 13; "storing the pressing force compensating amount in a table" as set forth in claim 14; "reading the pressing force compensating amount from a table" as set forth in claim 15; and "determining a relation between variation of the temperature and variation of the pressing force using experimentation" as set forth in claim 17. Therefore claims 6 – 11 and 13 – 19 are patentably distinguishable over the prior art.

Claim 12 depends from claim 1 and includes all the features of claim 1 plus additional features not taught or suggested by the prior art. Therefore claim 12 is patentably distinguishable over the prior art.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.


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If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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